DATA SHEET

vibro-meter®

VM600^{Mk2} RLC16^{Mk2} relay modules



RLC16^{Mk2}

KEY FEATURES AND BENEFITS

- VibroSight® compatible hardware from the vibro-meter® product line
- VM600^{Mk2} (second generation) relay modules
- Available in standard and SIL (safety) versions
- 16 user-configurable relays
- VM600^{Mk2} system safety-line to drive all system relays to a safe state
- Relay monitoring and power supply monitoring with module status output
- Epoxy-sealed relays with changeover contacts (SPDT)
- Compatible with VM600^{Mk2} system racks (ABE04x) and slimline racks (ABE056)
- Conforms to API 670
- Software configurable
- Live insertion and removal of modules (hot-swapping)
- Controlled by a VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} module
- Additional relays for VM600^{Mk2} systems



RLC16^{Mk2} SIL

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APPLICATIONS

- VM600^{Mk2} machinery protection (MPS) and/or condition monitoring (CMS)
- Vibration and/or combustion monitoring

APPLICATIONS *(continued)*

- API 670 applications
- RLC16^{Mk2} SIL version suitable for use in functional safety contexts in accordance with IEC 61508

DESCRIPTION

Introduction

The VM600^{Mk2} RLC16^{Mk2} relay modules are designed for operation with the second generation of VM600^{Mk2} rack-based machinery monitoring system, from Parker Meggitt's vibro-meter® product line. A VM600^{Mk2} RLC16^{Mk2} module consists of a single module that provides 16 additional user-configurable relays (per module) in VM600^{Mk2} systems, for when the 4 relays provided by a MPC4^{Mk2} + IOC4^{Mk2} module are not enough.

Note: The VM600^{Mk2} RLC16^{Mk2} module is available in a standard version (RLC16^{Mk2}) and a SIL safety version (RLC16^{Mk2} SIL).

VM600^{Mk2} rack-based monitoring systems

The vibro-meter® VM600^{Mk2} rack-based monitoring system is the evolution of Meggitt's solution for the protection and monitoring of rotating machinery used in the energy industry. VM600^{Mk2} solutions are recommended when a centralised monitoring system with a medium to large number of measurement points (channels) is required. It is typically used for the monitoring and/or protection of larger machinery such as gas, steam and hydro turbines, and generators, smaller machines such as compressors, fans, motors, pumps and propellers, as well as balance-of-plant (BOP) equipment.

A VM600^{Mk2} system consists of a 19" rack, a rack power supply and one or more monitoring modules. Optionally, relay modules, and rack controller and communications interface modules can also be included.

Two types of rack are available: a VM600^{Mk2} system rack (ABE04x – 6U) that can house up to twelve monitoring modules, and a VM600^{Mk2} slimline rack (ABE056 – 1U) that can house one monitoring module. The racks are typically mounted in standard 19" rack cabinets or enclosures installed in an equipment room.

Different VM600^{Mk2} monitoring modules are available for machinery protection, condition monitoring and/or combustion monitoring applications. For example, the MPC4^{Mk2} + IOC4^{Mk2} modules (available in standard and SIL versions) support both machinery protection and condition monitoring, the XMV16 + XIO16T module supports extended condition monitoring for vibration applications, and the XMC16 + XIO16T module supports extended condition monitoring for combustion applications.

In VM600^{Mk2} systems, the AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module adds machinery protection and condition monitoring support for applications with large numbers of slowly-varying (quasi-static) analog signals, such as temperature and other process variables.

Note: For VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} modules, machinery protection functionality is available by default and condition monitoring functionality is optional. For VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} modules, both machinery protection and condition monitoring functionality are available by default. It is important to note that condition monitoring functionality also depends on the purchased VibroSight® software license.

The RLC16^{Mk2} relay modules (standard and SIL versions) are optional modules used to provide additional relays when the four user-configurable relays per MPC4^{Mk2} + IOC4^{Mk2} module and/or the two user-configurable relays per AMC10^{Mk2} + IOC10^{Mk2} module are not sufficient for an application.

The CPUM^{Mk2} + IOCN^{Mk2} rack controller and communications interface module is an optional module used to provide additional VM600^{Mk2} system functionality such as fieldbus communications; module data aggregation, processing and sharing; rack and/or fieldbus communications redundancy; front-panel alarm reset (AR); MPS rack (CPUx)

DESCRIPTION *(continued)*

security; system event and measurement event logging.

VM600^{Mk2} rack-based monitoring systems complement the VibroSmart® distributed monitoring systems that are also available from Parker Meggitt's vibro-meter® product line, and are compatible with the same VibroSight® machinery monitoring software suite.

RLC16^{Mk2} modules and VM600^{Mk2} racks

RLC16^{Mk2} relay modules are used as part of a VM600^{Mk2} rack-based monitoring system.

A RLC16^{Mk2} module is always used under the control of an associated MPC4^{Mk2} or AMC10^{Mk2} module and can be used in a VM600^{Mk2} system rack (ABE04x) or a slimline rack (ABE056).

The RLC16^{Mk2} are single-width modules that occupies a single VM600^{Mk2} rack slot (module position). The RLC16^{Mk2} is installed in the rear of the rack and connects directly to the rack's backplane using two connectors.

Note: The RLC16^{Mk2} modules are compatible with all VM600^{Mk2} racks (ABE04x system racks and ABE056 slimline racks) and later VM600 racks.

RLC16^{Mk2} module functionality

The RLC16^{Mk2} module includes sixteen user-configurable relays (RL1 to RL16) that can be used by a VM600^{Mk2} system to remotely indicate system alarm and/or status information.

In general, VM600^{Mk2} system relays can be configured as normally energized (NE) or normally de-energized (NDE), and latched or not latched, as required by an application.

Most relays in a VM600^{Mk2} system are driven by control circuitry that supports a VM600^{Mk2} system safety-line, that is, a system-wide control signal that automatically drives all IOC4^{Mk2} and RLC16^{Mk2} relays, and IOC4^{Mk2} analog outputs to a safe state should a problem be detected. In this way, IOC4^{Mk2} and RLC16^{Mk2} relays configured as normally energized (NE) can always be de-energized in the event of a problem with one of the components of the relay coil control signal.

Note: This helps support the "de-energize to trip principle" required in safety-related applications.

However, IOC10^{Mk2} relays are under the direct control of the AMC10^{Mk2} module itself, that is, the VM600^{Mk2} system safety-line is not supported by the AMC10^{Mk2} + IOC10^{Mk2} module.

Accordingly, the behavior of a RLC16^{Mk2} module's relays depends on the controlling module – MPC4^{Mk2} or AMC10^{Mk2}.

System communications

In a VM600^{Mk2} system (that is, one or more MPC4^{Mk2} + IOC4^{Mk2} modules, AMC10^{Mk2} + IOC10^{Mk2} modules, any associated RLC16^{Mk2} modules, , and a optional CPUM^{Mk2} + IOCN^{Mk2} module), RLC16^{Mk2} modules are controlled and operated by an associated MPC4^{Mk2} or AMC10^{Mk2} module, as determined by the system's configuration. The VM600^{Mk2} rack's Open collector (OC) bus and Raw bus are used to exchange control and status information between the MPC4^{Mk2} + IOC4^{Mk2} or AMC10^{Mk2} + IOC10^{Mk2} and RLC16^{Mk2} modules, as required.

Software

The VibroSight® software supports the configuration and operation of VM600^{Mk2} modules, including the RLC16^{Mk2} relay module.

More specifically, a RLC16^{Mk2} module is controlled and operated by the associated MPC4^{Mk2} or AMC10^{Mk2} module, as part of a VM600^{Mk2} system that is configured using the VibroSight® software.

To prioritise machinery protection functionality and help meet stringent cybersecurity and API 670 requirements, machinery protection (MPS) and condition monitoring (CMS) functionality is segregated by using different VibroSight configuration software

For example, VibroSight Protect supports the configuration and operation of machinery protection system (MPS) functionality for a VM600^{Mk2} system, that is, for MPC4^{Mk2} + IOC4^{Mk2}, AMC10^{Mk2} + IOC10^{Mk2}, RLC16^{Mk2}, and CPUM^{Mk2} + IOCN^{Mk2} modules.

Refer to the *VibroSight® machinery monitoring system software data sheet* for further information.

DESCRIPTION *(continued)*

Different versions of the RLC16^{Mk2} module

The RLC16^{Mk2} relay module is available in different versions, as follows:

- RLC16^{Mk2} – this is the standard version of the module, suitable for most applications.
- RLC16^{Mk2} SIL – this is the SIL safety version of the module, suitable for critical applications demanding the highest level of protection.

The RLC16^{Mk2} (standard) is the original version of the module and supports all features and functions.

The RLC16^{Mk2} SIL is a version of the module optimised for use in safety-related applications (functional-safety contexts). Accordingly, it has been designed in accordance with the IEC 61508 “functional safety” standard and is certified as SIL 2 capable by design.

In general, the RLC16^{Mk2} SIL module supports the same functionality s as the RLC16^{Mk2} (standard) module but SIL versions of modules are visually distinct and feature some important differences in order to meet the strict requirements of SIL safety systems.

For example, a RLC16^{Mk2} SIL module’s user-configurable relays must be configured as normally energized (NE) and the common circuit-fault relay (FAULT) must also be used in order to help meet safety system requirements. The RLC16^{Mk2} SIL also runs diagnostics (BIST). For a more detailed comparison, see **Differences between standard and SIL versions of the VM600Mk2 MPC4Mk2 + IOC4Mk2 (and RLC16Mk2) modules starting on page 5**.

In addition, some versions of VM600^{Mk2} modules are also available with a conformal coating in order to provide additional environmental protection.

Applications information

As part of a VibroSight® / VM600^{Mk2} system solution, RLC16^{Mk2} relay modules – standard and/or SIL – allow additional relay outputs to be easily and efficiently added to machinery monitoring and protection systems in a wide range of industrial applications.

For further information, contact your local Parker Meggitt representative.

DIFFERENCES BETWEEN STANDARD AND SIL VERSIONS OF THE VM600^{MK2} MPC4^{MK2} + IOC4^{MK2} (AND RLC16^{MK2}) MODULES

Standard versions: VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} (and RLC16^{Mk2})	SIL versions: VM600^{Mk2} MPC4^{Mk2} SIL + IOC4^{Mk2} SIL (and RLC16^{Mk2} SIL)
Aluminium (silver) front panels (MPC4^{Mk2} + IOC4^{Mk2}, RLC16^{Mk2} modules)	Aluminum (silver) front panels with yellow/orange “SIL Safety” labeling (MPC4^{Mk2} SIL + IOC4^{Mk2} SIL, RLC16^{Mk2} SIL modules)
One electronics processing module on MPC4^{Mk2} for all functionality (measurements, management and interfacing)	Three electronics processing modules on MPC4^{Mk2} SIL: • 2 × processing modules for measurements (for measurement redundancy with cross-checking) • 1 × processing module for management and interfacing
Separation (firmware only) of machinery protection system (MPS) and condition monitoring system (CMS) functionality/processing on MPC4^{Mk2} module	Complete separation (hardware and firmware) of machinery protection system (MPS) and condition monitoring system (CMS) functionality/processing on MPC4^{Mk2} SIL module
MPC4^{Mk2} + IOC4^{Mk2} module only runs diagnostics	MPC4^{Mk2} SIL + IOC4^{Mk2} SIL module and RLC16^{Mk2} SIL module both run diagnostics
Up to 2 × tachometer (speed) signals/channels per MPC4^{Mk2} + IOC4^{Mk2} module	1 × tachometer (speed) signal per MPC4^{Mk2} SIL + IOC4^{Mk2} SIL module
Using the VM600^{Mk2}/VM600 rack’s Tacho bus, MPC4^{Mk2} + IOC4^{Mk2} modules can freely share tachometer (speed) channel signals between different modules. (That is, MPC4^{Mk2} + IOC4^{Mk2} modules can put signals on the Tacho bus and take signals from it too.)	Using the VM600^{Mk2}/VM600 rack’s Tacho bus, MPC4^{Mk2} SIL + IOC4^{Mk2} SIL modules can share tachometer (speed) channel signals between different modules. (That is, MPC4^{Mk2} SIL + IOC4^{Mk2} SIL modules can put signals on the Tacho bus and take signals from it too.) However, MPC4^{Mk2} SIL modules can only use such shared Tacho bus signals for CMS functionality/processing (not for MPS functionality/processing).
Digital high-pass filter (HPF) cutoff frequency up to 15 kHz	Digital high-pass filter (HPF) cutoff frequency up to 400 Hz
Up to 4 × user-configurable relays (RL1 to RL4) and 1 × common circuit-fault relay (FAULT) per MPC4^{Mk2} module	Up to 4 × user-configurable relays (RL1 to RL4) and 1 × common circuit-fault relay (FAULT) per MPC4^{Mk2} SIL module. Note: In safety-related applications, use of the FAULT relay is mandatory.
Up to 16 × user-configurable relays (RL1 to RL16) per additional RLC16^{Mk2} module	Up to 16 × user-configurable relays (RL1 to RL16) per additional RLC16^{Mk2} SIL module
User-configurable relays can be configured as normally energized (NE) or normally de-energized (NDE)	User-configurable relays can be configured as normally energized (NE) or normally de-energized (NDE). Note: In safety-related applications, relays must be configured as normally energized (NE).
Alarms and relays can be configured as latched or not latched	Alarms and relays can be configured as latched or not latched. Note: In safety-related applications, relays must be configured as latched.

DIFFERENCES BETWEEN STANDARD AND SIL VERSIONS OF THE VM600^{MK2} MPC4^{MK2} + IOC4^{MK2} (AND RLC16^{MK2}) MODULES *(continued)*

Standard versions: VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} (and RLC16^{Mk2})	SIL versions: VM600^{Mk2} MPC4^{Mk2} SIL + IOC4^{Mk2} SIL (and RLC16^{Mk2} SIL)
Machinery is protected when the MPC4^{Mk2} module's main operating mode is Locked or Unlocked	Machinery is protected only when the MPC4^{Mk2} SIL module's main operating mode is Locked. Note: In safety-related applications, a MPC4^{Mk2} SIL module can only run in the Locked state.
VM600^{Mk2} system (MPC4^{Mk2} + IOC4^{Mk2} module and any RLC16^{Mk2} modules) does not enter the safe state (fail-safe mode) if an input channel saturates	VM600^{Mk2} system (MPC4^{Mk2} SIL + IOC4^{Mk2} SIL module and a RLC16^{Mk2} SIL module) enters the safe state (fail-safe mode) if an input channel saturates for more than 1 hour
Live insertion and removal of modules (hot-swapping) is permitted with automatic reconfiguration of modules. That is, a replaced MPC4^{Mk2} module will be auto-configured by its associated IOC4^{Mk2} module.	Live insertion and removal of modules (hot-swapping) is permitted but automatic reconfiguration of modules is not supported. That is, a replaced MPC4^{Mk2} SIL module will not be auto-configured by its associated IOC4^{Mk2} SIL module. (It can only be configured manually using the VibroSight® software.)
Verification of MPC4^{Mk2} serial number by the VibroSight® software	Verification of MPC4^{Mk2} SIL and IOC4^{Mk2} SIL serial numbers by the VibroSight® software
Protection configuration signature not required	Protection configuration signature (SIL system signature) required. Note: Enforced by the VibroSight® software.
Enforcement of VM600^{Mk2} system (MPC4^{Mk2} + IOC4^{Mk2} and RLC16^{Mk2}) configuration rules by the VibroSight® software	Enforcement of VM600^{Mk2} SIL system (MPC4^{Mk2} SIL + IOC4^{Mk2} SIL and RLC16^{Mk2} SIL) configuration and safety rules by the VibroSight® software
Maximum altitude of 2000 m (6560 ft) for VM600^{Mk2} systems	Maximum altitude of 1600 m (5250 ft) for VM600^{Mk2} SIL systems

See Notes on the following page ...

DIFFERENCES BETWEEN STANDARD AND SIL VERSIONS OF THE VM600^{MK2} MPC4^{MK2} + IOC4^{MK2} (AND RLC16^{MK2}) MODULES *(continued)*

Notes

For standard applications, a VM600^{Mk2} system consists of only standard versions of modules: MPC4^{Mk2} + IOC4^{Mk2} modules and optional RLC16^{Mk2} modules. Accordingly, CPUM^{Mk2} + IOCN^{Mk2} rack controller and communications interface modules and other standard modules such as VM600^{Mk2}/VM600 XMx16 + XIO16T extended condition monitoring modules also be used in such systems.

For safety-related applications (functional-safety contexts), a VM600^{Mk2} system consists of only SIL versions of modules: MPC4^{Mk2} SIL + IOC4^{Mk2} SIL modules and optional RLC16^{Mk2} SIL modules. Accordingly, CPUM^{Mk2} + IOCN^{Mk2} rack controller and communications interface modules and other standard modules such as VM600^{Mk2}/VM600 XMx16 + XIO16T extended condition monitoring modules cannot be used as part of the SIL system. However, if such standard modules are not relevant to the safety function, they can coexist within a VM600^{Mk2}/VM600 system rack used in a safety application provided that the recommendations in the VM600^{Mk2} SIL safety manual are followed.

In general, standard versions of VM600^{Mk2} modules should be used with other standard VM600^{Mk2} modules, while VM600^{Mk2} SIL modules should be used with other VM600^{Mk2} SIL modules. However, since VibroSight 7.6 and the latest module firmware(s), the standard and SIL versions of VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} modules can now connected to and used with the standard and SIL versions of VM600^{Mk2} RLC16^{Mk2} modules. More specifically, it is now possible to use a MPC4^{Mk2} + IOC4^{Mk2} module to control the relays on a RLC16^{Mk2} SIL module, and a MPC4^{Mk2} SIL + IOC4^{Mk2} SIL module to control the relays on a RLC16^{Mk2} module. (Previously, no interoperation between the standard and SIL versions of VM600^{Mk2} modules was possible.)
Note: Even though the standard and SIL versions of VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} modules can now be connected to and used with the standard and SIL versions of VM600^{Mk2} RLC16^{Mk2} modules, the cross-compatibility between the standard and SIL versions of VM600^{Mk2} modules is not supported for safety-related applications (functional-safety contexts), and this is enforced by the VibroSight® software.

A VM600^{Mk2} SIL system (MPC4^{Mk2} SIL + IOC4^{Mk2} SIL) allows only 1 × tachometer (speed) signal per module because both auxiliary channels are used to provide a redundant and cross-checked tachometer input, where required, in safety-related applications (functional-safety contexts). This is part of the module's diagnostics (built-in self-test (BIST)), in order to verify that there is a valid and reliable tachometer.

A VM600^{Mk2} SIL system (MPC4^{Mk2} SIL + IOC4^{Mk2} SIL and an optional RLC16^{Mk2} SIL) will enter the safe state (fail-safe mode) whenever the module's diagnostics detects an issue that prevents normal operation, for example, hardware faults/problems, significant differences in the measurements from the redundant electronics processing modules, etc.

In the safe state, the MPC4^{Mk2} SIL module activates the system-wide VM600^{Mk2} system safety-line control signal in order to automatically drive all system relays and analog outputs to a safe state. However, it is important to note that only VM600^{Mk2} SIL system relays (that is, MPC4^{Mk2} SIL + IOC4^{Mk2} SIL relays and RLC16^{Mk2} SIL relays) are safety outputs. More specifically, they are SIL certified and can be used for critical functions in machinery protection applications, such as initiating the shutdown ("trip") of a machine. VM600^{Mk2} SIL system analog outputs are not safety outputs and should not be used for critical functionality.

In the safe state, the MPC4^{Mk2} SIL module also activates its status relay (common circuit-fault relay (FAULT) relay) in order to allow issues to be remotely detected/indicated. Front-panel LEDS are used for local indication.

For more detailed information on VM600^{Mk2} SIL systems in safety-related applications (functional-safety contexts), refer to the *VM600^{Mk2} machinery monitoring system – IEC 61508 SIL 2 MPS safety manual*.

SPECIFICATIONS

Functionality

Relay module	:	VM600^{Mk2} relay module with 16 user-configurable SPDT relays
Relay states	:	Normally energised (NE) or normally de-energised (NDE) for the standard version (RLC16^{Mk2}). Normally energised (NE) only for the SIL version (RLC16^{Mk2} SIL). Latched or unlatched (RLC16^{Mk2} and RLC16^{Mk2} SIL). Note: Configured/controlled by the MPC4^{Mk2} module (VM600^{Mk2} system) that the RLC16^{Mk2} module is associated with.
Default relay operation	:	Normally energised (NE) during normal operation – characterised by a closed circuit between the COM and NO contacts and an open circuit between the COM and NC contacts. That is, the "de-energise to trip" principle. Normally de-energised (NDE) when activated/driven individually or by the system-wide VM600^{Mk2} system safety-line control signal. Note: Also NDE when not activated/driven by the controlling MPC4^{Mk2} module (VM600^{Mk2} system), for example, during POST, module replacement or when the power supply is off.
Relay control	:	Each relay is energised by pulling the relay control signal to ground (GND) and de-energised by releasing its relay coil control signal. The activation of each relay depends on (1) the individual relay control signal (RL1 to RL16), (2) the relay module's power supply status and (3) the system-wide VM600^{Mk2} system safety-line control signal. That is, each relay is controlled by a relay coil control signal which is the logical AND of individual relay control signal, local power supply status and system-wide safety-line control signal. Note: In this way, RLC16^{Mk2} module relays configured as NE can always be de-energised in the event of a problem with one of the components of the relay coil control signal. That is, using the "de-energise to trip principle" required in safety-related applications.
Response time (guaranteed)	:	< 20 ms (from control signal change to contact changeover)
Relay monitoring	:	The RLC16^{Mk2} module monitors the state (coil voltage) of its own local relays for correct operation. That is, it checks that they are consistent with the relay control signals and energised/de-energised as appropriate.
Power supply monitoring	:	The RLC16^{Mk2} module monitors its own local power supplies for overvoltage, undervoltage and overcurrent conditions. That is, checks that they are within specification.

Note: For the RLC16^{Mk2} module, the status of the individual relays and power supply monitoring information is combined in a module status information bit that is shared with the controlling MPC4^{Mk2} module (VM600^{Mk2} system). If the MPC4^{Mk2} module detects a problem in a VM600^{Mk2} system, for example, due to the MPC4^{Mk2} module's diagnostics (BIST) or a RLC16^{Mk2} module's status bit, the MPC4^{Mk2} automatically generates a system-wide VM600^{Mk2} system safety-line control signal that drives all system relays (IOC4^{Mk2} and RLC16^{Mk2}) and analog outputs (IOC4^{Mk2}) to a safe state, that is, all relays in the VM600^{Mk2} system are de-energised.

Reliability	:	Integrated relay contact arc-suppression circuitry for improved reliability
Additional VM600 MPS relays	:	Up to five RLC16^{Mk2} modules can be controlled by a MPC4^{Mk2} module (VM600^{Mk2} system). One RLC16^{Mk2} SIL module can be controlled by a MPC4^{Mk2} SIL module (VM600^{Mk2} SIL system).

SPECIFICATIONS *(continued)*

VM600^{Mk2} module compatibility : In general, standard versions of VM600^{Mk2} modules should be used with other standard VM600^{Mk2} modules, while VM600^{Mk2} SIL modules should be used with other VM600^{Mk2} SIL modules.

Note: Since VibroSight 7.6, the standard and SIL versions of VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} modules can now connected to and used with the standard and SIL versions of VM600^{Mk2} RLC16^{Mk2} modules but this cross-compatibility between the standard and SIL versions of VM600^{Mk2} modules is not supported for safety-related applications (functional- safety contexts). See the Notes under the "Differences between standard and SIL versions of the VM600^{Mk2} RLC16^{Mk2} + IOC4^{Mk2} (and RLC16^{Mk2}) modules" table on page 6.

For reference, RLC16^{Mk2} modules (standard and SIL) include benefits and features such as improved relays, VM600^{Mk2} system safety-line functionality and module status monitoring that is not supported by the VM600^{Mk1} RLC16 relay card.

Note: In a VM600^{Mk2} system, MPC4^{Mk2} + IOC4^{Mk2} and RLC16^{Mk2} modules automatically configure their relays as normally energized (NE) or normally de-energized (NDE), as per the configuration created using VibroSight Protect, whereas VM600^{Mk1} MPC4/IOC4T and RLC16 cards use jumpers on the card to manually configure the relays as NE or NDE.

System communications

Internal – VM600^{Mk2} rack buses : Open collector (OC) bus and/or Raw bus to control and monitor RLC16^{Mk2} module relays, and distribute the system-wide safety-line control signal.
Raw bus to monitor/share the RLC16^{Mk2} module's status.

Note: Generally, in a VM600^{Mk2} rack (ABE4x), the Raw bus is used to share dynamic input signals between processing modules, the Tacho bus is used to share tachometer (speed) input signals between processing modules, and the Open collector (OC) bus is used by processing modules to drive relay modules, all in the same rack. For example, the Raw bus and the Tacho bus are commonly used to share sensor signals (vibration and speed respectively) between different machinery protection modules and/or condition monitoring modules.
Specifically for a VM600^{Mk2} system in a VM600^{Mk2} rack (ABE4x), the Open collector (OC) bus and/or Raw bus can be used to connect up to 32 outputs from a MPC4^{Mk2} + IOC4^{Mk2} machinery protection and condition monitoring module to RLC16^{Mk2} relay modules in the same rack, if additional relays are required.

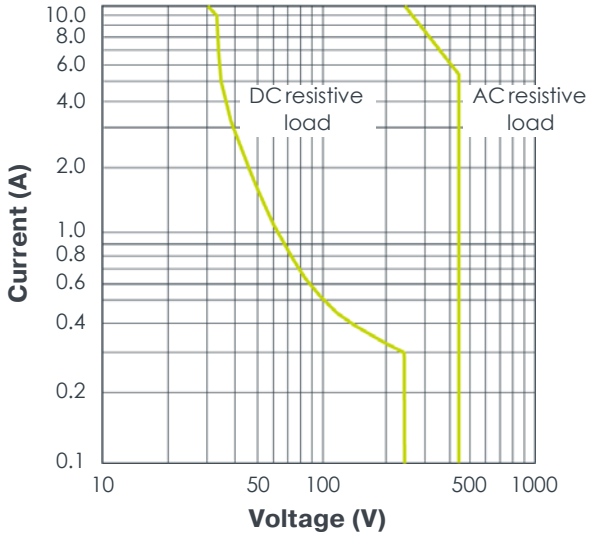
Configuration

RLC16^{Mk2} module : Configured and controlled by the MPC4^{Mk2} module (VM600^{Mk2} system) that the RLC16^{Mk2} module is associated with.
Note: Jumpers on the RLC16^{Mk2} module are manually configured to select the VM600^{Mk2} rack's Open collector (OC) bus and/or Raw bus lines that control and monitor the module's relays, and distribute the system-wide VM600^{Mk2} system safety-line control signal. The jumper information is generated by the VibroSight® software.

SPECIFICATIONS *(continued)*

Relay characteristics

Number	: 16 × user-configurable relays (RL1 to RL16)
Type	: Single-pole double-throw (SPDT) / 1 Form C, epoxy-sealed or equivalent
Contact arrangement	: 1 × COM, 1 × NC and 1 × NO contact per relay (RL1 to RL16). See **Connectors on page 11**.
Rated load	
• VDE	: 8 A at 250 V_{AC} resistive, 100k cycles
• UL	: 10 A at 250 V_{AC} resistive, 30k cycles. 10 A at 30 V_{DC} resistive, 30k cycles.
Maximum switching power	: 2500 VA / 300 W. Note: If the switching voltage is >30 V_{DC}, then special precautions must be taken. Contact Parker Meggitt (Meggitt SA) for more information.
Maximum switching voltage	: 240 V_{AC} / 125 V_{DC}
Maximum switching current	: 10 A
Safety approved contact rating	: 10 A at 240 V_{AC}. 10 A at 30 V_{DC}.
Maximum switching capacity curves	:



Operate / release time	: 7 / 3 ms typ.
Dielectric strength	
• Between open contacts	: 1000 $V_{AC\,(RMS)}$
• Between contact and coil	: 5000 $V_{AC\,(RMS)}$
Insulation resistance	: 1000 MΩ min. (at 500 V_{DC}, 50% relative humidity (RH))
Mechanical life	: >1 × 10^7 operations
Electrical life	: >1 × 10^5 operations (at 8 A, 250 V_{AC})

Note: In general, RLC16^{Mk2} module relays are limited to 240 V_{AC} max. in accordance with the EN 61010 electrical safety standard.

⚠ **When used in a VM600^{Mk2} slimline rack (ABE056) with a DC power supply, the relay contacts on a RLC16^{Mk2} module have a maximum switching voltage of 70 V_{DC} / 33 $V_{AC\,(RMS)}$ (46.7 $V_{AC\,(PEAK)}$).**

SPECIFICATIONS *(continued)*

Environmental

Temperature

• Operating	: −20 to 65°C (−4 to 149°F)
• Storage	: −40 to 85°C (−40 to 185°F)
Humidity	: 0 to 95% relative humidity (RH), non-condensing
Altitude	: 2000 m (6560 ft) max. for standard versions (RLC16^{Mk2}). 1600 m (5250 ft) max. for SIL versions (RLC16^{Mk2} SIL).

Approvals

Conformity	: European Union (EU) declaration of conformity (CE marking)
Electromagnetic compatibility	: EMC compliant (2014/30/EU): EN 61000-6-2:2005. EN 61000-6-4:2007 + A1:2011.
Electrical safety	: EN 61010-1:2010. CAN/CSA-C22.2 No. 61010-1.
Environmental management	: RoHS compliant (2011/65/EU)
Functional safety	: SIL 2 capable in accordance with IEC 61508:2010
Insulation coordination for measuring relays and protection equipment	: Separate circuits versions of modules according to IEC 60255-27

Power supply to module (input)

Power source	: VM600^{Mk2} rack power supply
Supply voltages	: 5 V_{DC}
Total power consumption (RLC16^{Mk2} module)	: < 4 W

Connectors

J1	: Phoenix contact 16-pin MC/GF connector (male), compatible with mating connectors (female) available with push-in connections or screw-terminal connections. Outputs (contacts) for relays RL1 to RL6.
J2	: Phoenix contact 16-pin MC/GF connector (male), compatible with mating connectors (female) available with push-in connections or screw-terminal connections. Outputs (contacts) for relays RL6 to RL11.
J3	: Phoenix contact 16-pin MC/GF connector (male), compatible with mating connectors (female) available with push-in connections or screw-terminal connections. Outputs (contacts) for relays RL11 to RL16.

Notes

The RLC16^{Mk2} module's connectors are removable to simplify installation and mounting.

For the J1, J2 and J3 connectors:

- Clamping range (min. to max.): 0.14 to 1.5 mm^2 (28 to 16 AWG) approx.
- Tightening torques (min. to max.): 0.2 to 0.25 N • m (0.15 to 0.18 lb-ft) approx. for conductor screws,
  0.2 to 0.3 N • m (0.15 to 0.22 lb-ft) approx. for mounting-flange screws.

The J1, J2 and J3 connectors provide 1 × COM, 1 × NC and 1 × NO contact per relay (RL1 to RL16).

SPECIFICATIONS *(continued)*

Physical

Height	: 6U (262 mm, 10.3 in)
Width	: 20 mm (0.8 in)
Depth	: 125 mm (4.9 in)
Weight	: 0.32 kg (0.71 lb) approx.

ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number (PNR)
RLC16^{Mk2}	Different versions of the VM600^{Mk2} RLC16^{Mk2} relay module:	
	– Standard version	600-045
	– Standard version, with conformal coating	600-045L
	The RLC16^{Mk2} ordering number PNR 600-045 corresponds to the underlying module version 620-026-100-1Hh, where “Hh” represents the hardware versions (“H” increments are for major modifications that can affect product interchangeability, “h” increments are for minor modifications that have no effect on interchangeability).	
RLC16^{Mk2} SIL	– SIL version	600-044
	The RLC16^{Mk2} SIL ordering number PNR 600-044 corresponds to the underlying module version 620-026-100-3Hh, where “Hh” represents the hardware versions (“H” increments are for major modifications that can affect product interchangeability, “h” increments are for minor modifications that have no effect on interchangeability).	

Notes

Conformal coating

VM600^{Mk2} RLC16^{Mk2} relay modules are also available with an optional conformal coating (“varnish”) applied in order to provide additional environmental protection against chemicals, dust, moisture, etc. Contact Parker Meggitt (Meggitt SA) for further information.

RELATED PRODUCTS

ABE04x	VM600^{Mk2}/VM600 system racks	: Refer to corresponding data sheet
ABE056	VM600^{Mk2}/VM600 slimline rack	: Refer to corresponding data sheet
AMC10^{Mk2} + IOC10^{Mk2}	VM600^{Mk2} temperature and analog monitoring modules	: Refer to corresponding data sheet
CPUM^{Mk2} + IOCN^{Mk2}	VM600^{Mk2} rack controller and communications interface module	: Refer to corresponding data sheet
MPC4^{Mk2} + IOC4^{Mk2}	VM600^{Mk2} machinery protection and condition monitoring modules	: Refer to corresponding data sheet
XMx16 + XIO16T	VM600^{Mk2}/VM600 condition monitoring modules	: Refer to corresponding data sheet
VibroSight®	VibroSight® machinery monitoring system software	: Refer to corresponding data sheet

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Local representative

Parker Meggitt (Meggitt SA) office

Parker Meggitt,
Motion, Power & Sensing Division (MPSD).
Meggitt SA, Route de Moncor 4, Case postale,
1701 Fribourg, Switzerland.
www.meggittsensing.com/energy
www.meggitt.com
www.parker.com